MACHINE-ASSISTED TRANSLATION (MAT):

(19)[ISSUING COUNTRY] Japan Patent Office (JP)

(12)[GAZETTE CATEGORY] Laid-open Kokai Patent (A)

(11)[KOKAI NUMBER] Unexamined Japanese Patent Heisei 11-267839

(43)[DATE OF FIRST PUBLICATION] October 5, Heisei 11 (1999. 10.5)

(54)[TITLE OF THE INVENTION] Arc welding processes

(51)[IPC INT. CL. 6] B23K 9/12 350
305
9/073 535
9/173

[FI] B23K 9/12 350 A
305
9/073 535
9/173 A

[REQUEST FOR EXAMINATION] No

[NUMBER OF CLAIMS] 2

[FORM of APPLICATION] Electronic

[NUMBER OF PAGES] 5

(21)[APPLICATION NUMBER] Japanese Patent Application Heisei 10-90735

(22)[DATE OF FILING] March 18, Heisei 10 (1998. 3.18)

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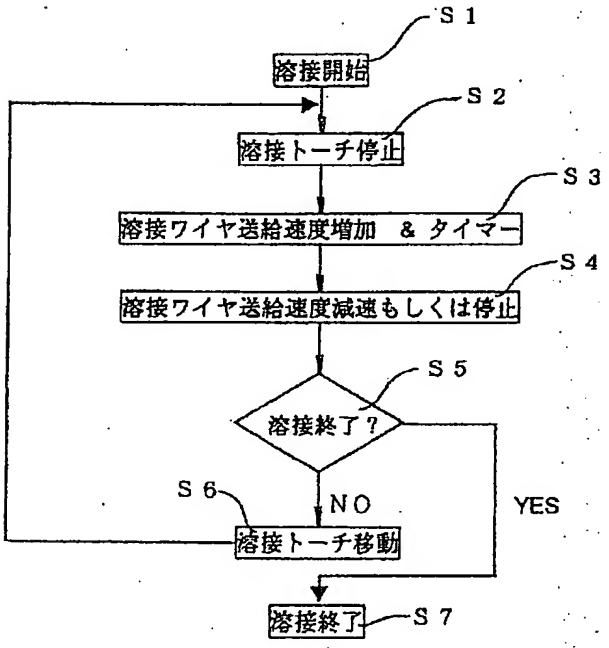
(57)[ABSTRACT OF THE DISCLOSURE]

[SUBJECT OF THE INVENTION] MIG arc welding processes which can obtain bead with welding fine sight of more than about the same as TIG welding is provided without generating spatter.

[PROBLEM TO BE SOLVED] Delivery operation of welding torch is stopped periodically (step S2), welding wire is supplied during stop of said delivery operation at high speed (step S3), and said welding wire is supplied during execution of said delivery operation at a low speed (step S4).
Moreover, alternate polarity operation is performed during stop of said delivery operation (step S13), and reversed polarity direct_flowing welding is performed during execution of said delivery operation (step S14).



[CLAIMS]

[CLAIM 1] Arc welding processes in which delivery operation of welding torch is stopped periodically, welding wire is supplied at high speed during stop of said delivery operation, and welding wire is supplied at low speed during execution of said delivery operation.

[CLAIM 2] Arc welding processes of Claim 1 in which alternate polarity operation is performed during stop of said delivery operation, and reversed polarity direct_flowing welding is performed during execution of said delivery

operation.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[TECHNICAL FIELD OF THE INVENTION] This invention relates to the automatic-arc-welding method which uses welding robot etc.
It is related with the MIG/MAG automatic-welding method which forms bead of the form of a fish scale which is acquired in particular by TIG welding by operator's manual work.

[0002]

[PRIOR ART] In recent years, metal object which joined aluminum and aluminum alloy by arc welding is widely used for components, such as building, automobile, and motorcycle.
These metal objects are used in form which can be directly seen from exterior.
Therefore, appearance of welded joint has major influence on fine sights, such as fine sight of these metal objects as a result building, automobile, and the whole motorcycle.
In particular, flaky bead is liked by consumer in motorcycle.
Then, TIG arc welding which adds filler wire is widely adopted as an arc welding processes from which appearance of good bead is acquired.
If it welds by this TIG arc welding, flaky regular bead will be obtained, it is supposed that it is more beautiful than bead of usual MIG arc welding.
However, since welding speed is slower than MIG arc welding processes, its productive efficiency is low, and it needs clearing work of electrode, and since still higher workpiece accuracy is required of this TIG arc welding, it is not the desirable welding method.
For this reason, method of obtaining flaky bead like TIG welding is proposed using MIG welding.
In Unexamined-Japanese-Patent No. 6-55268, delivery operation of welding torch of arc welding robot is performed intermittently, where welding torch is stopped, only fixed time generates arc, and welding base material is melted.
Next, arc is stopped, the welding method of moving welding torch to point by the side of melted outside periphery arc re-starting is disclosed.
At Unexamined-Japanese-Patent No. 6-190561, consumable electrode is supplied at fixed wire supply speed set up beforehand, let arc length of 1st pulse supplying electricity period which supplies electricity pulse welding current of 1st pulse-current group be 1st arc length, let arc length of 2nd pulse supplying electricity period which supplies electricity pulse welding current of 2nd pulse-current group be 2nd arc length of smallness from 1st arc length, the welding method which switches welding speed periodically synchronizing with change-over signal of 1st pulse supplying electricity period and 2nd pulse supplying electricity period is disclosed.

[0003]

[PROBLEM TO BE SOLVED BY THE INVENTION] However, according to experiment which inventor conducted, arc is repeated intermittently and it is

made to generate by the welding method of Unexamined-Japanese-Patent No. 6-55268.
Therefore, whenever it generates arc, there is problem that a lot of spatters occur.
Moreover, there is also problem that welding speed cannot be gathered, either.
In particular in welding of aluminum, generating of spatter spoils appearance of bead remarkably.
Moreover, also even by the welding method of Unexamined-Japanese-Patent No. 6-190561, appearance of bead obtained is as shown in FIG. 5.
Clear scale form which is obtained by TIG welding is not obtained, and small wrinkles arises on surface.
Therefore, there is problem that sufficient fine sight is not obtained.
In addition, graduation of scale which attached in lower part of screen of FIG. 5 is 1 mm.
Then, this invention aims at providing MIG arc welding processes which can obtain bead with fine sight of more than about the same as TIG welding, without generating spatter.

[0004]
[MEANS TO SOLVE THE PROBLEM] In order to solve the above-mentioned problem, this invention stops delivery operation of welding torch periodically, during stop of said delivery operation, welding wire is supplied at high speed, during execution of said delivery operation, said welding wire is supplied at a low speed.
Moreover, alternate polarity operation is performed during stop of said delivery operation, and reversed polarity direct_flowing welding is performed during execution of said delivery operation.

[0005]
[EMBODIMENT OF THE INVENTION] FIG. 1 is block diagram of automatic-welding apparatus for implementing this invention.
In FIG. 1, 1 is robot.
2 is robot controller, 3 is welding source.
4 is welding torch with pull type wire supply apparatus of servomotor actuation.
Welding source 3 is well-known welding source which can perform polar control.
Positive polarity or reversed polarity direct_flowing welding and alternate polarity operation are switched as desired, and it can apply.
Moreover, welding torch 4 actuates wire supply apparatus with servomotor.
Therefore, wire rate of feed can be altered as desired.
Robot controller 2 alters conditions, such as electric current of welding source 3, voltage, and polarity, while operating robot 1 according to predetermined program, moreover, signal which alters freely welding-wire supply speed of welding torch 4 can each be sent and controlled to welding source 3 and welding torch 4.
Flow of the welding method which shows 1st Example of this invention is shown in FIG. 2.
Hereafter, this flow is demonstrated according to FIG. 2.

First, welding is started in step S1 and arc is generated.
Next, it stops in step S2, movement in the direction of weld line, i.e., delivery operation, of welding torch 4.
Timer is started, while raising rotation of servomotor for actuation of wire supply apparatus of welding torch 4 in step S3 and accelerating supply speed of welding wire by command of robot controller 2 in it.
Therefore, while said timer acts, welding torch 4 stops by one point.
Welding-wire supply speed is increased in this state, sufficient melted pool is formed by melting a lot of welding wires.
Passage of time set up by said timer performs step S4, supply speed of welding wire is decelerated.
Welding-wire supply speed at this time maintains arc.
However, it is considered as speed which droplet transfer from welding wire to base material does not produce.
Supply of welding wire may be stopped depending on conditions.
However, it is required to maintain arc also in this case.
Furthermore, in step S5, it is judged whether welding of fixed weld line is completed.
If welding of fixed weld line is finalized, it will move to step S7 and welding will be terminated.
Step S6 is performed if welding of fixed weld line is not finalized, welding torch 4 is moved.
Next, from step S2 to step S6 is repeated until it flies to step S2 and welding of fixed weld line is finalized.
Movement of welding torch 4 in step S6 is movement of only distance according to size of melted pool formed in step S3 of direction which followed fixed weld line.
That is, said a part of melted pool formed whenever it repeats from step S2 to step S6 laps mutually, and only distance which forms flaky bead moves welding torch 4.
Thus, since stop and movement of welding torch 4 are repeated with arc maintained, there is little generating of spatter and flaky beautiful bead is formed.
Moreover, wrinkles with small bead surface which is problem by the welding method by prior art originates in ripple produced when droplet moves to melted pool.
Transfer to base material of droplet is stopped by step S4.
Therefore, after surface wave attenuates melted pool, it coagulates.
Therefore, wrinkles small to bead is not produced.
FIG. 3 is photography in which appearance of bead welded by the method of this 1st Example is shown.
In addition, graduation of scale which attached in lower part of screen of FIG. 3 is 1 mm.

[0006] Next, 2nd Example of this invention is demonstrated.
FIG. 4 is a flowchart which shows 2nd Example of this invention.

Fundamental flow is the same as that of 1st above-mentioned Example.
However, with step S13, it is set as state of alternating current of welding source 3, in step S14, place which sets welding source 3 as state of reversed polarity direct_flowing differs from 1st Example.
That is, delivery operation of welding torch 4 is stopped, while forming melted pool, alternate polarity operation is performed, and direct_flowing welding is performed while moving welding torch 4.
Major gap exists in welded joint, when board thickness of base material is thin, alternate polarity operation is advantageous.
Alternate polarity operation is because sufficient melted pool can be obtained by little penetration compared with direct_flowing welding.
However, alternate polarity operation which reversed polarity replaces periodically as it is positive polarity has unstable arc.
Since it is easy to produce ripple to melted pool, problem of being easy to produce small wrinkles is in bead.
In this 2nd Example,
after forming sufficient melted pool by alternate polarity operation,
welding source 3 is switched to reversed polarity direct_flowing of good arc stability, furthermore supply speed of welding wire is lowered and transfer of droplet is stopped. Therefore, after surface ripple attenuates melted pool, it coagulates.
Therefore, wrinkles small on bead surface is not produced.
There are such characteristics.
Therefore, the welding method of this 2nd Example is suitable for welding of thin plate or large coupling of gap in particular.

[0007]
[ADVANTAGE OF THE INVENTION] As stated above, according to this invention, there are the following effects.
(1) Continue welding, with arc maintained.
Therefore, there is little generating of spatter.
(2) Since there is no transfer of droplet while moving welding torch, small wrinkles does not occur in bead.
Flaky beautiful bead is obtained.
(3) Alternate polarity operation can be chosen.
Therefore, it can respond to thin plate or large coupling of gap.

[BRIEF DESCRIPTION OF THE DRAWINGS]
[FIG. 1] Block diagram of welding apparatus in which Example of this invention is shown.

[FIG. 2] Flowchart which shows 1st Example of this invention.

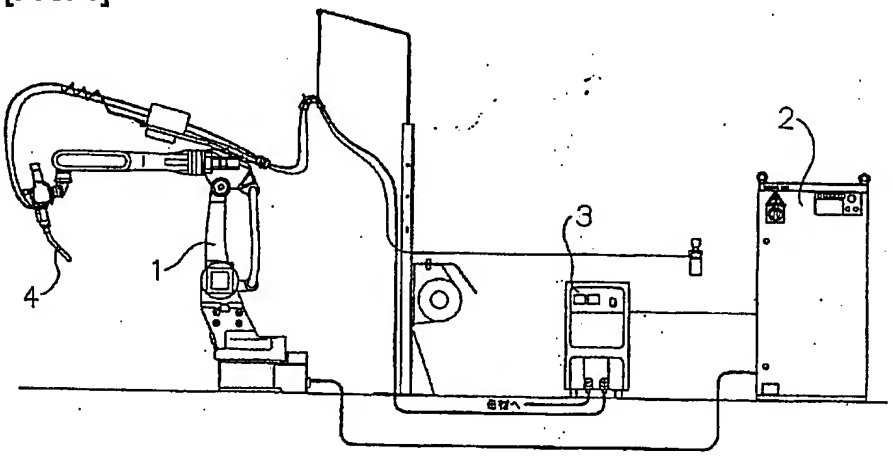
[FIG. 3] Appearance photography of bead in which 1st Example of this invention is shown.

[FIG. 4] Flowchart which shows 3rd Example of this invention.

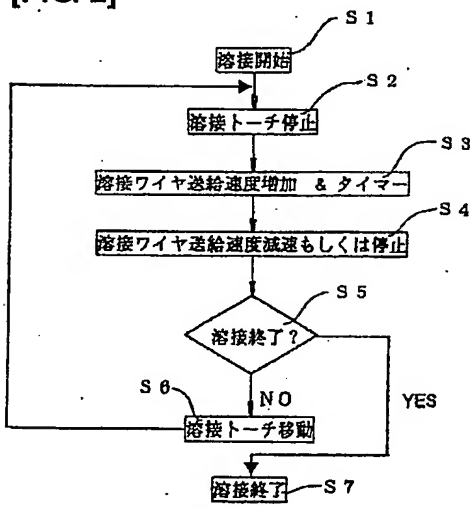
[FIG. 5] Appearance photography of bead in which prior art is shown.

[DESCRIPTION OF SYMBOLS] 1: Robot 2: Robot controller 3: Welding source
4: Welding torch

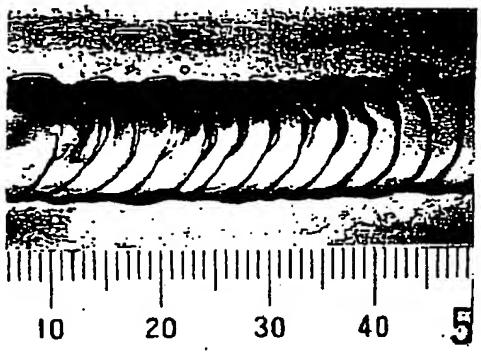
[FIG. 1]



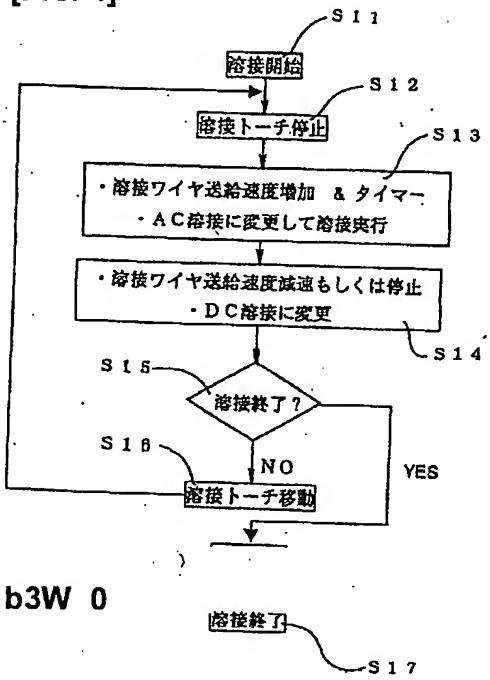
[FIG. 2]



[FIG. 3]



[FIG. 4]



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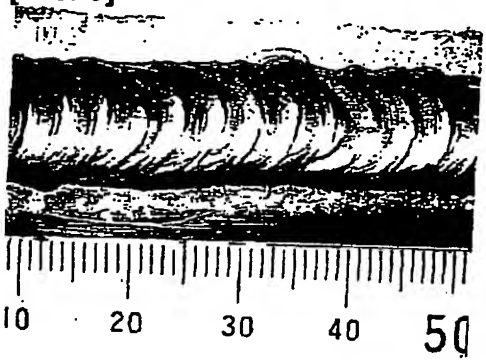
[FIG. 5]



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